NOV 4 1930

AMERICAN JOURNAL of PHARMACY

SINCE 1825

A Record of the Progress of Pharmacy and the Allied Sciences

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Vol. 102 OCTOBER, 1930 No. 10

CONTENTS

Editorial:
The Purpose of Pharmacy Week 557

Original Articles:
The Carbazole Reaction for Carbohydrates and Related Compounds. By Joseph S. Hepburn and Michael Lazarchick, Philadelphia, Pa. 560

A Chemical Study of Psyllium Seed. By Joseph S. Hepburn and Thos. L. Laughlin, Jr., Philadelphia, Pa. 565

Pig Stomach Fat. By Joseph S. Hepburn and Warren L. Trexler, Philadelphia, Pa. 569

Do Fu: An Oriental Food. By Joseph S. Hepburn and Keum Sung Sohn, Philadelphia, Pa. 570

The Examination of Cresyl-bearing Extracts of Ginger. By Peter Valaer, Washington, D. C. 571

Report of Committee on Drug Market, Pennsylvania Pharmaceutical Association 575

The Tinctures of Cinchona. (A Preliminary Report.) By Aaron Lichtin, Philadelphia, Pa. 583

Occult Power of the Nightshades. By Fred B. Kilmer, New Brunswick, N. J. 591

The Technic of Extracting Liquids Which Form Emulsions. By Walter Weinberger, New York City 594

Medical and Pharmaceutical Notes 596

News Items and Personal Notes 603

Book Reviews 605

Price $3.00 per Annum in Advance Foreign Postage, 25 Cents Extra

Single Numbers, 30 Cents. Back Numbers, 50 Cents

Entered as Second-Class Matter at the Post Office at Philadelphia, Pa., Under the Act of March 3, 1879

Acceptance for Mailing at Special Rate of Postage Provided for in Section 1103, Act of October 3, 1917. Authorized February 15, 1920

PUBLISHED MONTHLY BY THE

Philadelphia College of Pharmacy and Science

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NUTLEY NEW JERSEY

THE AMERICAN
JOURNAL OF PHARMACY

VOL. 102 OCTOBER, 1930 NO. 10

EDITORIAL

THE PURPOSE OF PHARMACY WEEK*

By Charles H. LaWall

Dean of the Philadelphia College of Pharmacy and Science.

I HAVE BEEN asked to say a few words over the radio today on the subject of Pharmacy Week and its purpose. In our present complex state of civilization we are constantly keyed up to such a dynamic point that mass or concerted action is usually necessary to produce impressions and to gain ends that might be very differently achieved if our social voltage were a little lower.

In the time of our grandfathers many things were taken for granted that now have to be proven, because in our day they are not quite so obvious. This is particularly true of the spirit and service of pharmacy. Contrast, for example, the drug store of several generations ago with the pharmacy of today. There are several outstanding points of difference. In the old-fashioned store the customer saw practically nothing but medicines. No one doubted the function and purpose of a pharmacy at that time. Rows and rows of bottles of all sizes, shapes, and colors filled the shelves, bearing attractively mysterious abbreviations of Latin titles. No one questioned that here were contained the potent agents required for the alleviation and cure of many human ills. If you wanted anything outside of a prescription or a household remedy you had to ask for it, and then perhaps you got it, but more likely you did not. And the peculiar odor that the old-fashioned always exhaled—that too was distinctive—not of the calling, but of that particular store, for it was often noted that no two stores ever smelled alike.

We must not forget, either, the colored show bottles of former days, symbolic of pharmacy from the early days when the drug store was the shop where large bottles of medicines in course of preparation were exposed to the rays of the sun. These famous old urns and bot-

*Broadcast from Station WLIT, Philadelphia, Friday, October 17, 1930, at 2.00 P. M.

tles with their unforgettable transparency and vividness of color made a lasting impression and carried a distinctiveness that was peculiar and unrivalled.

Contrast the picture of these memories with the conditions existing today. The rows and rows of medicine bottles have disappeared from public view. They are now back in the prescription department or in a stock room. The odor of valerian, camphor, asafetida or iodoform has been replaced by a pleasant aroma reminding one of Araby the blest, the composite effect of perfumes and toilet wares so conspicuously a part of today's pharmaceutical scenery. Even the colored show bottles have vanished, for in the mad rush to be modern many things of value and importance were abandoned.

The changes have been so great that it is even difficult in some modern stores, which have become departmentized (to use a modern commercial word) to find the prescription department, and it is little wonder that the purchasing public has, to some degree, lost sight of or forgotten the real underlying purpose of pharmacy.

Now there are some who are such worshippers of the old that they decry and belittle everything that is new, and sigh and hope for a return of the old. We can no more go back to the old-fashioned pharmacy than we can scrap and abandon our modern methods of heat, light, and transportation. Our aim today should be to understand the new. "Your druggist is more than a merchant" is a slogan which appeared a few years ago and which has obtained wide circulation. This does not mean that your druggist is a physician, able to diagnose diseases and recommend cures, but it does mean that the modern pharmacist is a college educated man, specifically trained to prepare and dispense medicines upon physicians' prescriptions. A careful citizen will choose his pharmacist with as much solicitude as he does his surgeon, his physician or his dentist, for in pharmacy just as in these other professions there are a few who place personal profit first and service to the community last. Sometimes this is the fault of the pharmacist himself and sometimes it is the fault of the neighborhood in which his store is located. If the neighborhood or the community does not appreciate nor make use of the pharmacist's scientific and professional qualifications, he may degenerate into one of the most commercially minded of tradesmen and his professional consciousness, nay, even his professional ability may so atrophy as to be of little or no use to the community. In these progressive times when advances in medicine and sanitation have lengthened the span of human life and diminished disease, there is not enough professional work to enable the pharmacist to earn a living. Consequently, the average pharmacist must sell what are called "side lines" in order to support the expensive overhead of his prescription service. The nature and extent of these lines are largely based upon the law of supply and demand—one of those laws which sometimes produces embarrassing results, but one which can never be repealed. What the neighborhood or community

demands in the matter of side lines the pharmacist will usually endeavor to supply. In the words of a popular song of former days, many a pharmacist can say to his neighborhood. "You made me what I am today; I hope you're satisfied."

The outward appearance of many pharmacies does not give a true indication of the professional service they are capable of rendering, and Pharmacy Week is the time when all pharmacists who are truly interested in their professional work, and take pride in performing it conscientiously, are given an opportunity of proving this fact to the public by means of appropriate window displays and other methods not incompatible with professional ideals.

There are approximately 60,000 pharmacists in the United States. Of these only about 30,000 are members of the professional organizations representing their calling. This is largely due to public indifference as to whether the pharmacist who serves its needs is measuring up to the ideals of pharmacy in his professional service to the community.

There is no one who can take the place of the pharmacist in the chain of service which has for its objects the cure of disease and the maintenance of public health. The trained and capable pharmacist supplements and makes effective the services of the competent physician or surgeon. Neither can properly function without the other. The pharmacist who attempts to diagnose and prescribe is not only recreant to the ethics of his profession, but is a violator of the law, while the physician who compounds and dispenses his own medicines, except in emergencies, is performing a function for which he is not properly qualified, for the compounding and dispensing of medicines requires special knowledge and skill in which years of training and experience are necessary in order to obtain proficiency.

Pharmacy is a profession which has its own history, traditions, ideals, literature, educational requirements, and code of ethics. Look up your pharmacist before the week is over. If he has a professional exhibit or display in his window or store, compliment him upon it and ask him questions about it. You will thus learn of the unusual breadth and thoroughness of his scientific knowledge and may grasp something of the interest and fascination connected with the many drugs and chemicals which he handles in connection with his professional work. If he has no exhibit, ask him "Why not?" If his answer is evasive or unsatisfactory you may draw your own conclusions as to his professional ability and standing.

The conscientious practice of professional pharmacy is an indispensible adjunct of public health conservation. From the days of Hippocrates to the time of Amos 'n Andy this has been so, and Pharmacy week has for its primary object the reminding of the public of this distinctive and necessary service.

CHARLES H. LAWALL.

ORIGINAL ARTICLES

THE CARBAZOLE REACTION FOR CARBOHYDRATES AND RELATED COMPOUNDS.

By Joseph S. Hepburn, A. M., M. S., Ph. D., and Michael Lazarchick

DISCHE (*Biochemische Zeitschrift*, 1927, *189*, 77-80) described characteristic color reactions of lactic acid, methyl glyoxal, and the carbohydrates with carbazole and sulphuric acid. These reactions are given by aldehydes, and by alpha hydroxy acids which are converted into aldehydes by sulphuric acid. The color varies with the conditions of the experiment. Thus lactic acid is stated to give either a brown or an olive green, arabinose, hexoses, and glucuronic acid either a lilac or a red. According to Dische, a distinctly positive reaction is given by a 0.001 per cent. solution of hexose; but the specific hexoses used are not enumerated. He obtained no color with "oxybutyric acid."

The test may be made in three different ways, which may be designated as R1, R2, and R3, respectively.

Procedure R1. Place 1 cc. of the solution to be tested in a test tube, add 2 cc. of concentrated sulphuric acid (specific gravity 1.84), mix, cool to room temperature, add 0.1 cc. of 0.5 per cent. solution of carbazole in alcohol, mix, cool to room temperature, place in a bath of boiling water, and heat for ten minutes.

Procedure R2. Proceed as in Procedure R1, but increase the volume of concentrated sulphuric acid used to 4 cc.

Procedure R3. Place 1 cc. of the solution to be tested in a test tube, add 4 cc. of concentrated sulphuric acid, mix, cool to room temperature, place in a bath of boiling water, heat for ten minutes, remove from the bath, cool to room temperature, add 1 cc. of distilled water, mix, again cool to room temperature, add 0.1 cc. of the alcoholic solution of carbazole, once more cool to room temperature, place in a bath of boiling water, and heat for ten minutes.

This test has been applied, in all three modifications, to freshly prepared aqueous solutions of the following carbohydrates and closely related compounds:

1. *Monosaccharides:* Xylose, dextrose, galactose, and levulose.
2. *Disaccharides:* Maltose, lactose, sucrose.
3. *Polysaccharide:* Starch (corn).
4. *Glucosides:* Amygdalin, digitonin, esculin, phloridzin, salicin.
5. *Hydroxy Acids:* Gluconic acid (as its calcium salt), mucic acid (as its ammonium salt), beta hydroxybutyric acid, acetoacetic acid (as its ethyl ester).

With the following exceptions, the initial experiment with each compound was made with its 1 per cent. aqueous solution; however, beta hydroxybutyric acid was used at an initial concentration of 0.842 per cent., xylose, esculin, and salicin 0.5 per cent., and phloridzin 0.1 per cent. The initial experiment with mucic acid was made with a solution containing 0.1 per cent. of that acid and just sufficient ammonia to hold the acid in solution. Each of the 17 compounds were also tested at concentrations of 0.1, 0.01, 0.001, and 0.0001 per cent.

The results of these tests are recorded in Table I, which shows for each compound the color (if any) given in each procedure at each of the specified concentrations. These results may be summarized as follows:

The deep brown or purple color yielded by 0.5 per cent. or 1 per cent. solutions of many of the compounds, especially the carbohydrates and glucosides, in all three procedures possibly was due to charring rather than to a true color reaction.

The colors usually produced by solutions containing 0.1 per cent. or less of the carbohydrate or related compound were blue, purple, lilac, or violet. With a single exception, green appeared only when procedure R2 was used; it then was yielded by lactose, esculin, and salicin in concentrations of 0.01 per cent. or less, and by the four hydroxyacids in concentrations of 0.1 per cent. or less.

Procedures R1 and R3 tended to give results in agreement with each other, but differing at times from those given by procedure R2.

The carbazole reaction by all three modifications was entirely negative, *i. e.,* its limit had been exceeded and no color formed, with 0.0001 per cent. solutions of the four monosaccharides, sucrose, cornstarch, digitonin, phloridzin, and mucic acid, and with 0.001 per cent. solutions of maltose, beta hydroxybutyric acid, and acetoacetic ester, while the reaction was still positive with 0.0001 per cent. solutions of esculin, salicin, and calcium gluconate. In the case of lactose and

amygdalin, the limit of the test varied with the procedure, the limit being exceeded with 0.0001 per cent. solutions in procedure R1, and with 0.001 per cent. solutions in procedures R2 and R3.

The carbazole reaction may serve as a group reaction. However, the colors produced by any one of the compounds used were not sufficiently characteristic to distinguish it from the other compounds in the group studied.

TABLE I

Color Reactions of Carbohydrates and Related Compounds With Carbazole

Compound	Procedure	1%	0.1%	0.01%	0.001%	0.0001%
Xylose[1]	R1	deep brown	purple	pinkish purple	faint lilac	no color
	R2	brownish purple	reddish purple	light purple	faint purple	no color
	R3	deep purple	purple	faint purple	faint lilac	no color
Dextrose	R1	brownish purple	bluish purple	lilac	faint lilac	no color
	R2	brownish purple	reddish purple	purple	faint purple	no color
	R3	brownish purple	bluish purple	light lilac	faint lilac	no color
Galactose	R1	dark brown	purple	reddish purple	faint purple	no color
	R2	dark brown	reddish brown	light purple	light purple	no color
	R3	dark brown	dark purple	purple	faint purple	no color
Levulose	R1	dark brown	purple	reddish purple	faint purple	no color
	R2	dark brown	reddish brown	light purple	light purple	no color
	R3	dark brown	dark purple	purple	faint purple	no color
Maltose	R1	dark brown	deep violet	lilac	no color	no color
	R2	dark brown	reddish purple	reddish purple	no color	no color
	R3	dark brown	purplish violet	lilac	no color	no color

[1] Initial concentration—0.5%.

TABLE I (Continued)

Color Reactions of Carbohydrates and Related Compounds With Carbazole

Compound	Procedure	1%	0.1%	0.01%	0.001%	0.0001%
Lactose	R1	deep brown	purple	purple	faint lilac	no color
	R2	reddish brown	reddish purple	green	no color	no color
	R3	brownish purple	deep purple	purple	no color	no color
Sucrose	R1	dark brown	dark purple	purple	faint lilac	no color
	R2	dark brown	reddish purple	reddish purple	light purple	no color
	R3	dark brown	dark purple	purple	faint lilac	no color
Corn Starch	R1	brownish purple	bluish purple	lilac	faint lilac	no color
	R2	brownish purple	reddish purple	purple	light purple	no color
	R3	brownish purple	reddish purple	light purple	faint lilac	no color
Amygdalin	R1	reddish brown	bluish purple	lilac	faint lilac	no color
	R2	reddish brown	dark red	reddish purple	no color	no color
	R3	reddish brown	reddish purple	light purple	no color	no color
Digitonin	R1	dark brown	cherry red	violet	faint lilac	no color
	R2	dark brown	reddish purple	light purple	faint purple	no color
	R3	dark brown	reddish purple	violet	faint lilac	no color
Esculin[1]	R1	dark brown	bluish purple	bluish purple	light purple	faint purple
	R2	dark brown	brownish purple	green	light green	faint green
	R3	dark brown	reddish purple	light purple	faint purple	faint purple

[1] Initial concentration—0.5%.

TABLE I (Continued)

Color Reactions of Carbohydrates and Related Compounds With Carbazole

Compound	Procedure	1%	0.1%	0.01%	0.001%	0.0001%
Phloridzin	R1		brownish purple	lilac	faint lilac	no color
	R2		reddish purple	reddish purple	light purple	no color
	R3		reddish purple	light purple	faint lilac	no color
Salicin [1]	R1	dark purple	bluish purple	violet	purple	faint lilac
	R2	dark brown	reddish purple	pale green	light green	faint green
	R3	dark purple	wine color	light violet	light violet	faint green
Calcium Gluconate	R1	dark blue	blue	light blue	light blue	faint lilac
	R2	dark blue	green	green	bluish green	faint green
	R3	light blue	light blue	light blue	light blue	faint lilac
Mucic acid	R1		blue	purple	lilac	no color
	R2		green	green	faint green	no color
	R3		lilac	lilac	faint lilac	no color
Beta-Hydroxybutyric acid [2]	R1	violet	lilac	faint lilac	no color	no color
	R2	light purple	light green	faint green	no color	no color
	R3	faint violet	faint lilac	faint lilac	no color	no color
Aceto-acetic ester	R1	brown	lilac	faint lilac	no color	no color
	R2	brown	green	light green	no color	no color
	R3	brown	lilac	faint lilac	no color	no color

[1] Initial concentration—0.5%.

[2] Initial concentration—0.842%.

John Clifford English Laboratories of Physics and Chemistry, Hahnemann Medical College and Hospital of Philadelphia.

A CHEMICAL STUDY OF PSYLLIUM SEED

By Joseph S. Hepburn, A. M., M. S., Ph. D., and Thomas L. Laughlin, Jr.

PSYLLIUM SEED, Semen Psyllii,[1] is the seed of Plantago Psyllium and related species of Plantago. By virtue of its indigestibility and mucilaginous character the seed acts as a mild laxative. The dose is from four to fifteen grams and may be administered from one to three times daily. The seed may be mixed with orange juice or prune juice and eaten without mastication; or it may be mixed with a little hot water, and the resulting gelatinous mass spread on bread or eaten with other food. When psyllium seed is mixed with an equal volume of water, mucilage exudes from the cell wall and a gelatinous mass is formed.

According to Solis-Cohen and Githens,[2] psyllium seed is used to increase the bulk of the feces in chronic constipation. They recommend that the seed be taken in doses of one to two teaspoonfuls with meals or two to four teaspoonfuls at the noonday meal. Prior to ingestion the seeds are to be steeped a few minutes in hot water; they swell and agglutinate into a soft mass which is then taken with honey or marmalade.

In addition to the methods of administration enumerated above, the label on a commercial package of medicinal psyllium seed suggests that the dry seed be placed in the mouth and followed by a swallow of water.

The sample of psyllium seed used in this study weighed twelve ounces. It was ground in a drug mill so that the entire quantity passed through a sieve with forty meshes to the linear inch. The following constituents were determined quantitatively: Total solids and moisture, crude fat or ether extract, total ash; insoluble ash, soluble ash, crude protein, crude fiber, pentosans, and galactans. The methods of analysis were essentially those of The Association of Official Agricultural Chemists,[3] reference was also made to the methods described by Pearson and Hepburn.[4] The total solids and moisture were determined by drying ten grams of the ground seed in a lead bottle cap at the temperature of boiling water. The crude fat or ether extract was determined on a two-gram sample of the ground seed by extraction for sixteen hours in a Knorr extraction apparatus which was heated by means of an electric stove; the extracted fat was dried at the temperature of boiling water. This temperature was obtained by means

of a water-jacketed drying oven. The ash determinations were made in a platinum dish which was heated in a gas-fired muffle furnace. The crude protein was determined on a two-gram sample by the Gunning modification of the Kjeldahl method; congo-red was used as the indicator in the residual titration; and 6.25 was used as the protein factor. Digestion and distillation were carried out in the same 500 cc. Kjeldahl flask; and the condenser had a block tin inner tube with a glass adapter at its bottom. The crude fiber determination was made on the fat-free residue remaining in the thimble after the quantitative extraction of the crude fat. For the determination of galactans and pentosans, separate two-gram portions of the ground seed were used. In the determination of pentosans the filtrate from the furfural phloroglucide was treated with an additional portion of phloroglucinol hydrochloric acid; failure of a precipitate to form demonstrated complete precipitation in the determination proper.

The desiccators were provided with anhydrous calcium chloride as a dehydrating agent. All weighings were made to one-tenth of a milligram. Titrations were made to one-twentieth of a cubic centimeter using a blue line glass stopcock burette.

The psyllium seed was found to have the following composition:

	Per Cent of:	
	Seed	*Total Solids*
Total solids	91.50	100.00
Moisture	8.50	0.
Crude fat	6.40	7.00
Total ash	3.16	3.45
Insoluble	2.95	3.22
Soluble	0.21	0.23
Crude protein	17.83	19.49
Crude fiber	11.50	12.57
Nitrogen-free extractives	52.61	57.49
Pentosans	9.85	10.77
Galactans	0.31	0.34

The alkalinity of the soluble ash was determined by its direct titration with deci normal hydrochloric acid. The alkalinity of the insoluble ash was determined by dissolving it in 25.00 cc. of deci normal hydrochloric acid diluted with distilled water and heated to boiling, followed by residual titration of the excess acid with deci normal sodium hydroxide. Methyl orange was used as an indicator. The

alkalinity has been reported as cubic centimeters of normal acid required to neutralize the ash (soluble or insoluble) yielded by 100 grams of total solids.

The values obtained were:

Alkalinity of soluble ash	6.48
Alkalinity of insoluble ash	41.72

Reducing sugars were not present, for 10 cubic centimeters of mixed Fehling solution were not reduced by as much as 5 cubic centimeters of a filtered 2 per cent. decoction of the ground seeds.

The crude gum was obtained by boiling the ground seed with fifty times its weight of water, filtering while hot, first through linen, then through filter paper, and evaporating the filtrate to dryness. The gum was black and tar-like, but became brittle when subjected to the temperature of the ice box and remained brittle when withdrawn from the latter. It was tasteless and odorless and became slippery and soft when held in the mouth. On analysis it was found to contain 16.45 per cent. pentosan and 0.02 per cent. galactan.

The gum was boiled with fifty times its weight of water; all but a few small flocks dissolved. The solution was filtered through linen. The filtrate had a brownish black color, was acid to litmus and did not gelatinize or thicken on cooling. The filtrate was characterized by the following responses to typical gum reactions which are described by Fuller.[5] In each test five cubic centimeters of the gum solution were used.

(a) Ferric chloride (1 cc. of 25 per cent. solution) produced a marked darkening in color, which disappeared on the addition of alcohol (15 cc. of 50 per cent. alcohol); no precipitate was formed.

(b) Lead subacetate (1 cc. of U. S. P. solution) produced a curdy precipitate.

(c) Copper sulphate (2 cc. of 10 per cent. solution) produced a transient mahogany color; further addition of an excess of sodium hydroxide (5 cc. of 5 per cent. solution) produced a voluminous flocculent bluish green precipitate which did not dissolve on boiling.

(d) Potassium hydroxide (2 cc. of 5 per cent. solution) followed by shaking produced a yellow froth.

(e) Iodine (several drops of Lugol's solution) produced no change save the color due to the presence of iodine. Starch and erythrodextrins therefore were absent.

(f) Alcohol (10 cc. of 95 per cent. alcohol) produced only a faint turbidity on mixing; in a few moments a marked flocculent precipitate appeared, at first filling the whole tube and gradually depositing on the bottom.

(g) Hydrochloric acid (5 cc. of 36 per cent. acid) and boiling darkened the solution and imparted to it a faint purple tinge.

(h) Sulphuric acid (5 cc. of concentrated acid) and boiling produced only a caramel odor. The odor of organic acids was not noticed.

(i) Phosphoric acid (5 cc. of 85 per cent. ortho phosphoric acid) produced, on boiling, a darkening of color, and the evolution of a fragrant odor. The odor of organic acids did not appear.

(j) Fehling's solution was not reduced.

(k) Borax (5 cc. of 2 per cent. solution) produced no change. Repetition of this test with 5 cc. of 4 per cent. solution of borax gave the same result.

(l) Lead acetate (5 cc. of 10 per cent. solution) produced a slimy, flocculent, voluminous, pale yellowish green precipitate.

Ewe's test [6] for Irish moss (carrageen) was also applied. However, a precipitate did not appear when as many as 5 cubic centimeters of the reagent (0.5 per cent. aqueous solution of methylene blue, U. S. P. X) were added drop by drop to 10 cubic centimeters of 0.4 per cent. solution of the crude gum. Likewise, no precipitate was formed when the methylene blue solution was added to 5 cubic centimeters of a 2 per cent. decoction of the ground seeds; the decoction was filtered through filter paper, and the test was applied to the filtrate while still hot, and also after cooling to room temperature.

Psyllium seed has been analyzed quantitatively and the qualitative reactions of its gum have been studied.

BIBLIOGRAPHY

(1) *New and Non-Official Remedies*, 1925, page 314.

(2) Solis-Cohen and Githens, *Pharmacotherapeutics*, 1928, page 996.

(3) Official and Tentative Methods of Analysis of the Association of Official Agricultural Chemists, Second Edition, 1925.

(4) Pearson and Hepburn, *Physiological and Clinical Chemistry*, 1925, pages 136-142.

(5) Fuller, *The Chemistry and Analysis of Drugs and Medicines*, 1920, pages 460-472.

(6) Ewe, *Journal of the American Pharmaceutical Association*, 1930, *19*, 568-570.

John Clifford English Laboratories of Physics and Chemistry, Hahnemann Medical College and Hospital of Philadelphia.

PIG STOMACH FAT

By Joseph S. Hepburn, A. M., M. S., Ph. D., and Warren L. Trexler, B. S.

PIG STOMACH FAT is a by-product of the preparation of desiccated pig stomach used as a remedy in pernicious anemia. A sample of pig stomach was found to contain 4.60 per cent. of crude fat or ether extract.

A sample of the fat was obtained from several kilograms of fresh pig stomach which had been ground in a meat chopper. The ground tissue was dried in a water-jacketed oven at a temperature of 100 degrees C. for several hours, then extracted by percolation with several successive portions of petroleum ether (purified petroleum benzin U. S. P. X). After the fat had been completely removed and was in solution in the petroleum ether, the solvent was completely removed by distillation on a water bath at a temperature of 100 degrees C. The constants of the fat were then determined. The analytical procedures were according to the "Official and Tentative Methods of Analysis of the Association of Official Agricultural Chemists," Second Edition, 1925. The iodine number was determined by the Hanus method, the index of refraction by means of an Abbe refractometer. The soluble acids have been calculated as per cent. of butyric acid. The following constants were obtained:

Iodine number	29.9
Saponification number	184.3
Hehner number	90.5
Soluble acids	0.06
Index of refraction at 27.5 degrees C.	1.4663

John Clifford English Laboratories of Physics and Chemistry, Hahnemann Medical College and Hospital of Philadelphia.

DO FU: AN ORIENTAL FOOD

By Joseph S. Hepburn, A. M., M. S., Ph. D., and Keum Sung Sohn

THE ORIENTAL FOOD, known as *do fu* in Chinese and as *doo pu* in Korean, is a soy bean preparation. The beans are soaked with twice their volume of cold water for twenty-four hours, then ground with the water. The resulting mass is filtered through a coarse linen bag. The white, milky filtrate is heated in a vessel, with occasional stirring, until it begins to foam. Then a saturated solution of sodium chloride is added until coagulation is complete. The coagulated mass floats on the brine, is collected, placed in a linen bag, and subjected to pressure with a light weight for two or three hours in order to remove the adherent liquid. The resulting cake is kept in an ice box or in cold water.

A sample of *do fu,* purchased in the "Chinatown" of Philadelphia, was analyzed according to the "Official and Tentative Methods of Analysis of the Association of Official Agricultural Chemists," Second Edition, 1925, and found to have the following percentage composition:

Total solids	13.37
Moisture	86.63
Ether extract	4.65
Crude fiber	None
Crude protein	4.22
Ash	0.59
Nitrogen-free extractives	3.91

John Clifford English Laboratories of Physics and Chemistry, Hahnemann Medical College and Hospital of Philadelphia.

THE EXAMINATION OF CRESYL-BEARING EXTRACTS OF GINGER

By Peter Valaer*

THE USE of alcoholic extracts of ginger for beverage purposes was extensive even before the advent of Prohibition, and soon after the law became active the manufacture for sale of the tincture was forbidden, and in its place was allowed the double-strength tincture. This, however, did not stop its beverage use, and all ginger extracts, except U. S. P. fluid extract, were declared fit for beverage purposes. Even this did not stop the beverage use of ginger, for in the years that followed there appeared on the market light-colored alleged fluid extracts of ginger which were quite mild in character and containing the same solid content as U. S. P. fluid extract. The chemical analysis showed these gingers to be adulterated with molasses, glycerine, sugars, herb extracts, gums, pine resins, castor oil, and other foreign ingredients. These adulterated gingers, while highly intoxicating, caused no other illness.

Late in February and early in March of 1930, newspapers in Mississippi, Tennessee, Kansas and other States began to bear news of a strange epidemic that had befallen many of the people, causing them to become paralyzed in hands and feet, many thousands becoming hopeless cripples. Except in mild cases, there have been no recoveries reported. From March to July it was estimated that approximately 20,000 people had felt the effect of this poison-bearing ginger which acted specifically on the lower motor neurons of human beings.[2]

Hundreds of samples began to flow into the Bureau of Industrial Alcohol for analysis. Many of these samples were positively declared to have caused paralysis. It was soon apparent to the chemists of the Bureau of Industrial Alcohol that new and strange ingredients were present never before found in adulterated fluid extracts of ginger. After a week of extensive work by five experienced chemists, the presence of a cresol compound was discovered. This was soon found to be in the ester form as tri-ortho-cresyl phosphate.

When this adulterated ginger is evaporated at low temperature to a small volume by a downward current of air, there are formed two

*Chemist, Bureau of Industrial Alcohol, Treasury Department, Washington, D. C.

distinct layers: one a yellow upper layer in which was found some alcohol, water, and di-ethylene glycol; the lower black layer contained principally tri-ortho-cresyl phosphate, rosin oil, oils and resins of ginger, and a small amount of an unidentified tar-like substance. The routine and research work in connection with the analysis of several hundred of these paralysis producing gingers from March to August has failed to show the presence of any trace of denaturants used in complete or specially denatured alcohol.

A quick qualitative test for phenols can be made as follows: Place 5 cc. sample in a porcelain dish, add 3 cc. 1 : 1 sodium hydroxide, stir, evaporate off alcohol, cautiously acidify with 1 : 1 sulphuric acid, when the odor of cresol will be strong, even permeating throughout a large room.

The di-ethylene glycol is obtained by purifying with chloroform and ether the yellow layer already described above and obtaining it by fractional distillation, and after purifying it by redistillation apply the physical and chemical constants necessary to identify it positively.

The most significant ingredient, tri-ortho-cresyl phosphate, is obtained by washing the black lower layer described above first with water and then with approximately 5 per cent. ammonium hydroxide. The tri-cresyl phosphate is obtained by submitting the residue to fractional distillation using a high vacuum. The fraction coming off at the proper temperature is purified by redistillation and the physical and the chemical constants determined.

The phosphates are determined in the usual way except that 5 cc. saturated magnesium nitrate solution is evaporated with the 10 cc. fluid extract of ginger used for analysis.

Although it was certain early in March that the tri-cresyl-phosphate was present to the extent of about 2 per cent., it almost escaped blame because reference books on therapeutics failed to list this ester as a poison or to mention that it would cause paralysis.

It was the excellent work of the pharmacologists of the Hygienic Laboratory, working under the direction of Dr. Maurice Smith, that first brought to light the remarkable physiological properties of this phenol ester and thus opening a new field in pharmacology.[1]

The best subjects used by Dr. Smith, strange to say, were calves. This suggestion came to him through a midwest country veterinarian who paralyzed his ailing calf patients by dosing them with the poisonous fluid extract, thinking he was giving them an old-fashioned remedy.

This alleged fluid extract ginger was also thoroughly examined for mineral and alkaloidal poisons, and no trace of the ordinary poisonous substances was found. More than twenty-five gallons of ginger was used up in the chemical experimental work.

Up to date many theories have been advanced as to the cause of the paralysis outbreak. Among these was the possible presence of poisonous roots foreign to ginger. This danger is quite unreal, for ginger root is not gathered by savages digging at random in the woods. Rather it is a large and definite agricultural pursuit and it is practically impossible for any foreign root to become mixed with the crop.

Ginger ale or ginger ale extract is in no way concerned with the above-mentioned phenol. Ginger ale extract is an entirely separate material not sold at all to the general trade in retail quantities and only used for manufacturing purposes; it has never been found adulated or is there any occasion for it being adulterated. There is absolutely no record or evidence of any kind of any paralysis cases originating from ginger root, ground ginger, ginger ale extract or ginger ale.

The purpose of adding these adulterated ingredients found in the alleged fluid extract of ginger was solely for the object of substituting inert and tasteless solids for the true oleo resin of ginger so that the product would be less pungent and fit for use as a beverage. It was probably added by an ingenious underworld chemist who had an ideal mixture with which to baffle the Government chemists. All the ingredients are quite miscible with each other and with a small amount of oleo resin of ginger used so that it could be sold as a fluid extract of ginger. The whole very cheap mass is readily soluble in alcohol and is insoluble in water and exceedingly difficult to identify as to its composition. It is quite unlikely that this bootleg chemist was aware of its poisonous properties. Although many distributors and dealers have been prosecuted or indicted up to date, it is not certain that the actual manufacturer has been apprehended. Were the guilty one required to wander to Lee's Corner, Ga., or through the other small towns in Mississippi, Oklahoma, Kansas, or Texas, he would readily see the result of his fiendish handiwork.

Tri-ortho-cresyl phosphate is one of the most stable esters used in commercial organic chemistry. It is sold in large quantities under various trade names, as a liquid plasticiser, and is used extensively in lacquers, leather dopes, airplane finishes, etc. It can be obtained from the paralytic ginger in sufficiently pure form to be used for chem-

ical and physiological tests, by the process already described. Work is being done to extract it more easily from the adulterated ginger. Five liters of the adulterated fluid extract is a convenient workable quantity.

Dr. Watkins, of New Orleans,[10] working independently of Government agencies, found that chickens could be readily paralyzed with the adulterated ginger. These experiments were repeated by other investigators in other localities. Alcohol and true U. S. P. fluid extracts of ginger fail to produce any paralytic symptoms.

TABLE FOR COMPARISON

	Paralytic Ginger	Genuine F. E. Ginger U. S. P.
Container and Label	Small 2 oz. bottles, labels uniform	Labels & containers vary with mfr.
Color by 1/16″ cell brewers' scale	Much lighter Average 4.5 [8]	Much darker 19-25 (Lovibond tintometer)
Odor	Mild. Molasses-like	Highly aromatic ginger like—pungent
Taste	Mild, sweetish Weak ginger after taste	Burning hot
Solids-ash alcohol	Normal for a U. S. P. product	Same
As, S, Pb and N	None. Trace of N	None None. Trace of N
Denaturants	None	
Oil of Ginger	.25% (2.5 cc. per liter)	1.6% (16 cc. per liter)
Cresylic odor	No odor of cresol before hydrolysis Strong odor after hydrolysis	No odor of cresol either before or after hydrolysis
Cresols	Equivalent of 2% by vol. of tricresyl phosphate	None
P_2O_5 per 100 cc.	.2987 gm.	Very slight trace
Tricresylphosphate	2%	None
Diethylene glycol	1%	None
Rosin oil, heavy oils & gums (not identified)	Slightly over 1%	None

REFERENCES

(1) *Journal American Pharmaceutical Assn.*, Vol. 27, No. 7 (1928), page 630.
(2) *Public Health Report*, Vol. 45, No. 30 (1930), page 1730.
(3) *Collier's Weekly*, July 26, 1930.
(4) *Allen's Commercial Analysis*, Vol. IV, 5th Ed., page 265.
(5) *Oil, Paint and Drug Reporter*, April 7, 1930.
(6) *Oil, Paint and Drug Reporter*, July 21, 1930.
(7) *The Literary Digest*, August 9, 1930.
(8) *Catalogue*, Eimer & Amend.
(9) Dr. Bowden, Oklahoma City, Okla., Health Dept. Laboratories.
(10) Dr. Watkins, Tulane University.
(11) *Washington Evening Star*, August 22, 1930 (Mr. Henry).
(12) *Washington Evening Star*, August 27, 1930 (Mr. Henry).

REPORT OF COMMITTEE ON DRUG MARKET

to the

PENNSYLVANIA PHARMACEUTICAL ASSOCIATION ANNUAL CONVENTION*

TO THOSE interested in the scientific phase of pharmacy the material gathered and presented in a report of this kind is of considerable value, as it brings together the accumulated facts obtained by those actually engaged in drug distribution, pharmaceutical manufacturing and in analytical research. It is the endeavor of your committee to present only items of value and particularly those instances of adulteration and inferiority that are continually being met. It is also our custom to present the brighter side by noting instances of improvement in formerly sub-standard products and of increased excellence in a normally standard product. All things considered, it is plainly evident that the condition of drugs as found on the market is generally satisfactory. This conclusion is based on the relatively small proportion of sub-standard products found as compared with the large number examined by the contributing laboratories.

An infrequent condition is noted this year in the number of substandard chemicals found such as potassium iodide containing free iodine, tartaric acid with an excess of lead, tetrachlorethylene containing an excess of carbonizable impurities; sodium citrate that was too alkaline and insufficiently soluble. Similar conditions were noted in a sample of absolute alcohol that had an objectionable odor and which was also not clearly miscible with water; also, glycerin containing an excess of carbonizable impurities; ephedrine sulphate contaminated with the hydrochloride, and liquid petrolatum that was objectionable because of carbonizable impurities, fluorescence and solid paraffins. An interesting item is shown in a report of creosote that had an abnormal odor, a low boiling point and contained cærulignol. Although the foregoing deficiencies are not serious they reveal a condition of undesirable inferiority that should not prevail and also emphasizes the importance as stated by George A. Slothower of "constantly controlling the quality of crude materials entering into the manufacture of pharmaceuticals."

A very objectionable condition was discovered in a sample of ovarian gland substance that yielded 73 per cent. of ash. Upon examination the ash was found to be calcium carbonate. As this product

*Buena Vista Spring Hotel, Buena Vista, Pa., June 17-18-19.

was offered as a pure article it can be considered as a grossly adulterated preparation.

The usual condition prevailed in the crude drug field. Some drugs were practically worthless, others were dirty and moldy and contained a large excess of foreign or inactive material. The outstanding inferior drugs were Jamaica dogwood consisting almost entirely of stem bark instead of the root bark; thyme which was composed almost entirely of stems and black haw containing 42 per cent. of adhering wood. Those classed with the moldy and dirty products include a lot of moldy burdock root and aletris, valerian and blue cohosh containing considerable adhering earthy material. One lot of blue cohosh also contained cimicifuga. Instances of contamination with foreign drugs were rhubarb containing rhaptonica rhubarb, sanguinaria containing geranium rhizomes, two lots of spigelia containing ruellia, and larkspur contaminated with an unidentified foreign seed.

There also were shipments of catnip peppermint and pipsissewa that were rejected because of excessive stems. In contrast to these it was found that recent importations of fennel seed and Hungarian chamomile flowers had a very bright, clean appearance and were very satisfactory.

The alkaloidal drugs were generally satisfactory. Each of the five lots of ipecac was well above the U. S. P. standard. One lot of hydrastis was a trifle low in alkaloids, but all other lots were quite satisfactory. Colchicum corm was not as satisfactory, as two of the five lots were below the standard. Of the nine samples of red cinchona examined two were below the requirements. The other seven were appreciably above the U. S. P. standard of not less than 5 per cent. The alkaloidal content of the nine samples ranged from 4.48 per cent to 11.25 per cent.

It was found that 77 per cent. of the physiologically tested drugs were above the standards.

Conditions in the spice market were generally satisfactory. The principal discrepancies were found in a lot of coriander seed containing an excess of stones and foreign seeds, and a lot of Saigon cinnamon that contained 90 per cent. of Fagot cinnamon.

In addition to the foregoing general observations and analyses your committee submits the following more specific information upon the material examined. This material was submitted by the following laboratories: H. K. Mulford Co. (Sharpe & Dohme), LaWall and Harrisson, and Smith, Kline & French.

ABSOLUTE ALCOHOL

One lot was rejected because it was not clearly miscible with water and had an objectionable foreign odor.—*J. J. Farley.*

ALETRIS

One sample yielded 20.7% of total ash and 17.6% of acid-insoluble ash. The N. F. allows not more than 10% of acid-insoluble ash.—*H. Haefelin.*

BENZOIN

The alcohol-soluble extractive of five samples was as follows: 76.5%, 64.6%, 76%, 71.5% and 89.6%. The U. S. P. standard is not less than 75% of alcohol-soluble extractive.—*Ko Suto.*

BENZOIN-SUMATRA

Recently it has been difficult to obtain Sumatra-Benzoin yielding not less than 75% of alcohol-soluble extractive. Most of the lots found on the market contain from 2% to 5% less. This material, however, is suitable for manufacturing purposes provided the product is standardized to comply with the U. S. P., requirements.—*J. Mervin Rosenberger.*

BENZYL BENZOATE

One lot was slightly colored and was acid to litmus. A 10 cc. sample yielded .0045 gm. of solids after ignition. The N. N. R. describes Benzyl Benzoate as a colorless oily liquid, neutral to litmus and yielding no weighable residue on the ignition of ten cubic centimeters.—*H. Luckings.*

BLACK HAW

Adhering wood to the extent of 42% was present in one sample. The N. F. allows not more than 7% of wood or other foreign organic matter.—*H. Haefelin.*

BURDOCK ROOT

One sample was rejected because it was excessively moldy.—*H. Haefelin.*

CALCIUM CARBONATE

An excess of iron and other heavy metals was present in one lot.—*R. Beresford.*

CIMICIFUGA

Blue Cohosh was present in one sample of Cimicifuga. Another lot was rejected because of an excess of earth adhering to the rhizome and roots—*H. Haefelin.*

CINCHONA RED

Nine samples yielded the following amounts of alkaloids: 4.84%, 4.48%, 6.93%, 6.60%, 6.02%, 11.25%, 7.34%, 10.6% and 7.27%. The U. S. P. standard is not less than 5% of the alkaloids of cinchona.—*Ko Suto.*

CINCHONA YELLOW

The assay of three samples showed the presence of 4.99%, 5.36% and 4.81% of the alkaloids of cinchona.—*R. Beresford.*

CINNAMON SAIGON.

One lot consisted of 90% of Fagot Cassia. This sample was practically devoid of oil and was mucilaginous.—*H. Haefelin.*

COLCHIUM CORM

The alkaloidal content of five lots was .365%, .35%, .347%, .313%, and .405% Colchicine. The U. S. P. standard is not less than .35% of Colchicine.—*R. Beresford.*

CORIANDER

One lot was rejected because of an excess of stones and foreign seeds.—*H. Haefelin.*

CREOSOTE

One sample did not meet the U. S. P. standard because 25% distilled over at less than 200° C. and 73% from 200°-218° C. This sample possessed an abnormal odor and responded to the U. S. P. test for caerulignol.—*H. Luckings.*

EPHEDRIN SULPHATE

The specific rotation of two lots was —26.0 and —24.0 at 20° C., which is below the N. N. R. standard of —29 to —30 at 20° C. Another sample showed a specific rotation of —31.6 at 20° C. This sample also showed the presence of three times the N. N. R. limit for chlorides. The high specific rotation reading and the excess of chlorides would indicate that this sample was contaminated with ephedrin hydrochloride.—*H. Haefelin.*

FLAXSEED

Recently several lots of Ground Flaxseed have appeared on the market yielding insufficient non-volatile ether-soluble extractive.—*J. Mervin Rosenberger.*

GAMBIR

The two samples of this drug examined yielded 75.9% and 38.7% of water-soluble extractive. The U. S. P. standard is not less than 70% of water-soluble extractive.—*H. Luckings.*

GLYCERIN

One lot was rejected because .026% of residue remained after burning and .0114% after ignition. The U. S. P. allows not more than .015% of carbonaceous residue and not more than .007% of ignited or mineral residue.—*H. Tranchitella.*

GRINDELIA

The examination of one sample showed 28% of stems over 2 mm. in diameter. The N. F. standard is not more than 10% of stems over 2 mm. in diameter.—*H. Haefelin.*

HELLEBORE ROOT—WHITE

The law requiring that the amount of active ingredients as well as the inert material be placed on the labels for White Hellebore Root is very beneficial. Recent importations show that the total alkaloids have been running considerably higher than in last year's importations. A lot recently received contained 1.069% of total alkaloids and 98.931% of inert material. A lot last year contained 0.64% of total alkaloids and 99.36% of inert material.—*J. Mervin Rosenberger.*

HYDRASTIS

The alkaloidal content of four samples was 3.78%, 2.44%, 2.83% and 3.31% of ether-soluble alkaloids of Hydrastis. The U. S. P. standard is not less than 2.5% of ether-soluble alkaloids.—*Ko Suto.*

IPECAC

Nine samples yielded the following amounts of alkaloids: 2.14%, 2.33%, 2.08%, 2.28%, 2.02%, 1.96%, 2.38%, 2.19% and 2.24%. The U. S. P. standard is not less than 1.75% of ether-soluble alkaloids.—*R. Beresford.*

IRISH MOSS BLEACHED

A recent lot received was very unsatisfactory because of having been poorly bleached. It was far from being a bleached moss.—*J. Mervin Rosenberger.*

LARKSPUR

An unidentified foreign seed contaminated one lot of Larkspur Seed.—*H. Haefelin.*

OLEORESIN MALEFERN

Two lots were rejected because they contained only 21.2% and 20.18% of crude filicin. The U. S. P. standard is not less than 24% of crude filicin.—*R. Beresford.*

MALT EXTRACTS

An extensive examination conducted during the past year disclosed the fact that practically all the brands examined of malt extract distributed in tins, were devoid of diastase activity.—*J. W. E. Harrisson.*

MALVA FLOWERS—BLUE

Several lots have appeared on the market containing very few actually blue flowers.—*J. Mervin Rosenberger.*

MYRRH

The alcohol-soluble extractive of three samples was 47.26%, 45.5% and 29.0%. The U. S. P. standard is not less than 30% of alcohol-soluble extractive.—*Ko. Suto.*

OVARIAN GLAND SUBSTANCE

Offered as Ovarian Gland Substance a sample yielded 73.1% of ash, which was found on chemical analysis to consist almost entirely of chalk.—*H. Luckings.*

PISCIDIA

One lot consisted almost entirely of stem bark, whereas the root bark is preferred. The Committee on Unofficial Standards proposes a standard allowing not more than 5% of stem bark to be present in Jamaica Dogwood.—*H. Haefelin.*

PETROLATUM LIQUID

One sample was rejected because it contained an excess of carbonizable substances and solid paraffins. Another lot had a distinct blue fluorescence.—*J. J. Farley.*

PETROLATUM LIQUID

The rejection of one shipment was recommended because of the presence of a decided excess of carbonizable impurities. An immediate dark color was obtained on the addition of the sulphuric acid.—*T. R. Singer.*

POTASSIUM IODIDE

Free iodine was present in one lot of Potassium Iodide.—*R. Beresford.*

POTATO STARCH

Moisture to the extent of 19.9% was present in one lot of potato starch. The U. S. P. standard for corn starch is not more than 14% moisture.—*H. Luckings.*

QUINCE SEED

There is quite a lot of Quince Seed on the market of very poor quality and when used for making emulsions produces a mixture of exceedingly poor quality.—*J. M. Rosenberger.*

RESIN SCAMONY

Two lots were incompletely soluble in alcohol.—*T. R. Singer.*

RHUBARB

One lot was rejected because of the presence of Rhaptonic Rhubarb.—*H. Haefelin.*

SANGUINARIA

Geranium rhizomes were found in one lot of Blood Root. This condition was also encountered last year and noted in our last report.—*H. Haefelin.*

SODIUM CITRATE

One sample was rejected because it did not meet the U. S. P. solubility tests and was distinctly alkaline to phenolphthalein. A 1:20 solution of U. S. P. Sodium Citrate is slightly alkaline to litmus, but it should not be reddened with phenolphthalein.—*J. J. Farley.*

SOLUTION IRON CHLORIDE

One shipment was a little below the U. S. P. minimum requirement in iron content and specific gravity.—*T. R. Singer.*

SPIGELIA

Two lots showed the presence of Ruellia.—*H. Haefelin.*

STYRAX

The five lots examined yielded the following results:

	Insoluble Matter	Non-Volatile Alcohol-Soluble Matter
1	2.77%	82.6%
2	5.00	76.0
3	3.71	77.0
4	3.44	75.4
5	3.33	74.6
U. S. P. Standard		
Not more than	5%	Not less than 70%.—*Ko Suto.*

TARTARIC ACID

Two samples were rejected because they contained more than twice the amount of lead allowed by the U. S. P.—*J. J. Farley.*

TETRACHLORETHYLENE

An excess of carbonizable substances was present in one lot of tetrachlorethylene.—*H. Luckings.*

THYME

One lot consisted almost entirely of stems, whereas the N. F. permits not more than 3% of stems over 1 mm. in diameter.—*H. Haefelin.*

VALERIAN

One sample was excessively dirty and yielded 27.0% of total ash and 19.6% of acid-insoluble ash. The U. S. P. standard is not more than 10% of acid-insoluble ash.—*H. Haefelin.*

REPORT ON SPICES

Type	Number Examined	Number Rejected	Total Ash Max. %	Total Ash Min. %	Acid Insol. Ash Max. %	Acid Insol. Ash Min. %	Ether Extract Non-Volatile Max. %	Ether Extract Non-Volatile Min. %	Ether Extract Volatile Max. %	Ether Extract Volatile Min. %
Allspice	5	0	4.80	4.30	0.45	0.05	8.20	5.40	....	....
Cinnamon	4	0	6.70	5.00	1.32	0.60	2.9	1.45	3.8	2.55
Clove	5	0	6.15	4.00	0.45	0.25	9.95	8.26	17.0	16.2
Coriander	3	0	5.6	5.4	0.60	0.60	24.10	22.5	1.10	0.5
Ginger	14	0	8.3	3.5	1.15	0.10	cold water ext.		19.0	14.0
Mace	22	6	3.0	2.05	1.02	0.25	32.00	21.70	....	....
Mustard	5	0	4.2	3.3	0.25	0.20	37.7	28.6	....	....
Nutmeg	5	0	1.90	1.80	0.50	0.05	38.6	37.5	....	....
Pepper	15	1	6.05	4.13	0.55	0.10	11.42	8.50	....	....
Black	12	0	1.90	0.75	0.4	0.05	8.90	7.60	....	....
Cayenne	8	0	7.70	5.40	0.4	0.30	23.80	15.6	....	....
Sweet Red	10	1	8.9	6.5	0.98	0.30	13.80	12.7	....	....

General condition in the spice market was fair with considerable price fluctuation. Some difficulty was experienced in obtaining capsicum of the required pungency.—*J. W. E. Harrisson.*

The following table shows the ninth report on the weight of unit volume of crude drugs made in the Analytical Department of the H. K. Mulford Company (Sharp & Dohme) during the year June 1, 1929, to June 1, 1930:

Drug	Vol. cc.	Weight Gms.	Aver.	Remarks
Anise	100	44		
Caraway	200	92	91	
		90		
Cardamon	200	128	128.7	
		128		
		129.2		
Celery Seed	100	48	48.1	
		48.3		
Colchicum	100	73	73.5	
		74		
Ergot	200	90.5		large grains
		99		
		105		small grains
		105		small grains
		99	99.7	
Fennel	100	29		
Fenugreek	100	76	75	
		74		
Juniper	200	71	69.5	
		68		
Larkspur	200	96		
		92		
		88		spurious seed
		92		
		91	91.7	
		91.4		
Rhammus Cathartica	200	84.0		

—*H. Haefelin.*

The following table shows the results of the physiological assay of 26 crude drugs made in the Physiological Testing Laboratory of the H. K. Mulford Company (Sharp & Dohme) during the year June 1, 1929, to June 1, 1930:

Drug	No. Samples	Assay Lowest	Highest	Above	Below
Aconite	4	142	166	4	0
Cannabis	5	100	120	5	0
Digitalis	6	102	140	6	0
Ergot	3	120	135	3	0
Squill	2	105	120	2	0
Strophthanus	6	83	93	0	6
Total	26			20	6

Therefore, 77% of the crude drugs were above standard.

—*P. Masucci, A. Quici.*

Respectfully submitted by

J. G. ROBERTS, *Chairman,*
G. A. SLOTHOWER,
JOS. W. E. HARRISSON,
J. MERVIN ROSENBERGER.

June 18, 1930.

THE TINCTURES OF CINCHONA

(First Paper)

A PRELIMINARY REPORT

By Aaron Lichtin, Ph. G.

I. The Problem

THE OBJECT of this investigation is to find a method to prepare the official tinctures of cinchona, which will yield a therapeutically active and, at the same time, a stable product. The subject of this study, undertaken in connection with pharmacopœial revision, is included in a bulletin issued by the Committee of Revision (1920-30) entitled "Research on Pharmacopœial Problems," and comprises such problems which in the opinion of the Committee "were not yet satisfactorily solved." In the course of the investigation no thought was given to economic considerations or controversial questions relating to the use of alcohol. The first consideration was given to prepare a preparation of "therapeutic power and dependability," to quote W. L. Scoville.

The work reported herein was done on the simple tincture. Studies which are being made on the compound tincture will be reported later.

II. Introductory Remarks

The tinctures of cinchona are old preparations. Though the simple tincture has been official in the U. S. P. since its first edition in 1820, the pharmacopœial process does not yield a stable preparation. The complete extraction of cinchona is laborious and a perplexing problem and the stabilization of the finished preparations is equally difficult. Shortly after the preparation is made a precipitate forms and after standing several months not only is a heavy sediment present on the bottom of the container but the inner sides become coated with a reddish brown substance possessing a gummy character. This condition has attracted many investigators and attempts have been made to prevent it, but without ultimate success.[1] [2]

The causes that lead to precipitation in the tinctures are not clearly understood. It has been observed, however, that the precipi-

tates are rich in tannins and alkaloids.[1] Some investigators presented the theory that some of the tannins that are soluble during the process of extraction become insoluble on standing due to a hydrolytic action, entangle the alkaloids and carry them down with the precipitate. This theory is borne out by the observation that on chemical examination of old precipitated tinctures the upper layers will be found to be relatively poorer in alkaloids than the lower ones and the precipitate itself is found to be quite rich in alkaloidal content. A sample examined assayed 0.7 p. c. for the first 25 cc., 0.8 p. c. for the second 25 cc. and 1.2 p. c. for the last 25 cc. which contained the entire precipitate.

To stabilize the tinctures many suggestions have been offered: the modification of the pH of the menstrua or finished preparations, the use of stronger alcohol, etc., but no satisfactory results have been obtained. Recently Scoville[2] made an extensive study of the extraction of cinchona and the stabilization of its preparations. His conclusions are: (1) "The present official menstrua for the official preparations of cinchona contain the best proportions of alcohol for these. Glycerin is also advisable but is better added to the percolate or concentrate rather than used in the menstruum. (2) Hydrochloric acid aids very markedly in extracting the alkaloids of cinchona and should be used in the following proportion and manner: For cinchona calisaya a 1.5 p. c. solution of (absolute) hydrochloric acid in the official menstruum (without glycerin), this amount of acid to be based on the quantity of drug and used and employed in a corresponding quantity of menstruum used for the initial maceration. Percolation is then continued with a neutral menstruum. Thus for 100 gm. of drug, the first 100 cc. of menstruum used should contain 1.5 p. c. of hydrochloric acid and the drug macerated in this for 24 to 48 hours. For red cinchona the first equivalent menstruum should contain 2.5 p. c. to 3 p. c. of hydrochloric acid, used in the same way. (3) Hydrochloric acid, used in proper proportions, imparts stability to the preparation, reducing precipitation and holding the alkaloids in solution. This property is further aided by glycerin or sugars." Elsewhere[3] Scoville states that "hydrochloric acid and 78 p. c. alcohol materially aid in extraction of alkaloids of cinchona."

The use of stronger alcohols in menstrua and the addition of glycerin to preparations is based on the dehydrolyzing action of these substances.

III. Experimental

A

A quantity of calisaya bark assaying 7.3 p. c. alkaloids was used in preparing a tincture according to the U. S. P. X formula, filtered and bottled in a number of six-ounce bottles of flint, amber and alkali free glass. The finished tincture assayed 1.2 p. c. alkaloids, and several reagents, as mentioned in Table I, were added to the bottles which were then stored under varying temperatures, as outlined in the aforementioned bulletin of the U. S. P. Revision Committee. The object of these experiments was to determine the effect of oxidizing agents, reducing agents, alkalinity, light, temperature, alkalinity of glass, etc., on the official simple tincture. Table I shows the procedure used and results obtained.

TABLE I

Preparation	Temperature						Appearance at end of 6 months	
	Room		Hot		Cold			
I. Neutral								
A. Flint glass	one	sample	one	sample	one	sample	heavy	sediment
B. Amber glass	"	"	"	"	"	"	"	"
C. Alkali-free glass (Pyrex)	"	"	"	"	"	"	"	"
II. Acid—1.5 cc. 0.1% HCl added to each sample.								
A. Flint glass	one	sample	one	sample	one	sample	heavy	sediment
B. Amber glass	"	"	"	"	"	"	"	"
C. Alkali-free glass (Pyrex)	"	"	"	"	"	"	"	"
III. Alkali—2 cc. 40% KOH solution added to each sample.								
A. Flint glass	one	sample	one	sample	one	sample	heavy	sediment
B. Amber glass	"	"	"	"	"	"	"	"
C. Alkali-free glass (Pyrex)	"	"	"	"	"	"	"	"
IV. Oxidizing Agent—2 cc. 3% H_2O_2 solution added to each sample.								
A. Flint glass	one	sample	one	sample	one	sample	heavy	sediment
B. Amber glass	"	"	"	"	"	"	"	"
C. Alkali-free glass (Pyrex)	"	"	"	"	"	"	"	"
V. Reducing Agent—5 cc. 10% hypophosphorous acid added.								
A. Flint glass	one	sample	one	sample	one	sample	heavy	sediment
B. Amber glass	"	"	"	"	"	"	"	"
C. Alkali-free glass (Pyrex)	"	"	"	"	"	"	"	"

Explanatory Note

"Hot" temperature of about 80°-90° F.
"Cold" temperature of ordinary ice refrigerator 40°-45° F.
"Room" temperature of 70°-75° F.
"Acid" 1.5 cc. 0.1% HCl added to give faintly acid reaction to litmus.
"Alkali" 2 cc. 40% KOH added to give reaction alkaline to litmus.
"Reducing Agent" 5 cc. 10% hypophosphorous acid added to observe action of weak reducing agent.

It is evident from the foregoing table that the above procedure does not yield satisfactory results. The preparation is not stabilized by the addition of acid, alkali, oxidizing or reducing agents. It is not preserved by amber, alkali-free glass or refrigeration.

B

In subsequent experiments eight different menstrua were employed in extracting the bark.

Menstruum 1: The U. S. P. X menstruum and method.

Menstruum 2: The U. S. P. X menstruum and method but with the glycerin placed in the receiving vessel, instead of being used in the maceration process, and the percolate made up to the desired volume.

Menstruum 3: Four volumes of alcohol and one of water (78 p. c. alcohol) used both in maceration and percolation.

Menstruum 4: The U. S. P. X menstruum to which is added 1.5 p. c. absolute hydrochloric acid, based on the quantity of bark, and this mixture used in maceration only. Subsequently percolation is performed with a menstruum of two volumes of alcohol and one of water.

Menstruum 5: Four volumes of alcohol and one of water (78 p. c. alcohol) used both in maceration and percolation, but before percolation an amount of glycerin is placed in the receiving vessel equivalent to 7.5 p. c. of the volume of the expected percolate and then allowing percolation to proceed to the desired volume.

Menstruum 6: The U. S. P. X menstruum without glycerin to which is added 1.5 p. c. absolute hydrochloric acid based on the quantity of the bark and used in macerating. Subsequently percolation is performed with four volumes of alcohol and one of water, placing in the receiving vessel an amount of glycerin equivalent to 7.5 p. c. of the expected percolate and then allowing percolation to proceed to the desired volume.

All tinctures were prepared from a bark assaying 7.3 p. c. alkaloids and filtered.

Table II shows results obtained.

TABLE II

Menst. used	% Alkaloids	Quantity of Tincture Prepared	Sp. Gr. at 25° C. Approx.	Appearance after standing 3 months
1	1.2%	200 cc.	0.9384	Heavy sediment; material adhering to the sides of bottle.
2	1.1%	200 cc.	0.9333	Sediment; no material adhering to sides of bottle.
3	1.1%	200 cc.	0.8969	Sediment; material adhering to sides of bottle.
4	1%	200 cc.	0.9475	Sediment; no material adhering to sides of bottle.
5	1.1%	200 cc.	0.9515	Slight sediment; no material adhering to the sides of bottle.
6	1%	200 cc.	0.9454	Sediment; no material adhering to sides of bottle.
7	1%	1000 cc.	0.8969	Flocculent sediment; no material adhering to sides of bottle.
8	1.1%	200 cc.	0.9259	Slight sediment; no material adhering to sides of bottle.

A comparison of the various preparations reveals that 78 p. c. alcohol with HCl and subsequent addition of glycerin to the percolate yields the most stable tincture. The fact, however, that even this preparation showed a sediment, though a relatively slight one, led to further investigation of the tincture. It was noticed that HCl, while acting as a stabilizer did not materially affect the alkaloidal content. The dehydrolyzing agents, strong alcohol and glycerin aided by HCl produce a relatively stable preparation. Assuming that hydrolysis is the cause of the instability of the tincture, why not remove the cause, to a large extent at least?

Experiments were undertaken to perform this. Considering that acetone is an efficient solvent for tannins it was thought desirable to extract the bark with acetone first and then prepare a tincture of the treated bark.

C

A preliminary extraction of fifty grams of bark was made to determine if the acetone removes alkaloids. It was found that percolation with acetone leaves the alkaloidal content practically unchanged.

Five hundred grams of calisaya bark assaying 7.3 p. c. alkaloids were then percolated with acetone in the usual manner until the percolate showed only a faint reaction with ferric chloride solution. Another way to determine the approximate end point of the percolation was as follows: Five cc. of the percolate was mixed with 10 cc. distilled water and one drop gelatin test solution added. A faintly greenish, slightly opalescent solution resulted which did not become turbid on standing ten or fifteen minutes. It was found that about 1000 cc. of percolate was required before obtaining the desired end point. The bark thus treated was then dried on a water bath at a temperature not over 60° C. and several tinctures prepared as shown in Table III.

TABLE III

Menst. used	% Alkaloids	Quantity of Tincture Prepared	Sp. Gr. at 25° C. Approx.	Appearance after standing 3 months
1	1%	200 cc.	0.9299	Slight sediment. Very thin film on sides of bottle.
2	1%	200 cc.	0.9272	Slight sediment; no material on sides of bottle.
3	1.1%	200 cc.	0.8954	Slight sediment; gummy material adhering to sides of bottle.
4	1%	200 cc.	0.9227	Slight sediment; gummy material on bottom of bottle.
5	1%	200 cc.	0.9090	No sediment; no material on sides of bottle.
6	1%	200 cc.	0.9645	Slight sediment; no material on sides of bottle.
7	1.1%	200 cc.	0.9030	Slight flocculent sediment; no material on sides of bottle.
8	1.2%	200 cc.	0.9318	Slight sediment; no material on sides of bottle.

An examination of the foregoing table revealed that the most stable preparation was obtained with a menstruum of 78 p. c. alcohol with the addition of glycerin to the percolate. (Menstruum 5.) The alkaloidal content does not depend on the strength of alcohol. Strong alcohol acts as a stabilizer and the stabilizing property is enhanced by the addition of glycerin to the percolate. The use of hydrochloric acid (menstruum 8) showed a slight increase in alkaloidal strength but the finished tincture is not as stable as that made with menstruum 5. Another advantage of tincture 5 over tincture 8 is that it yields a neutral tincture, while tincture 8 is acid in reaction.

IV. The Acetone-Extracted Substance

A preliminary examination of the acetone-extracted substance revealed the following properties. It is a black or greenish black tarry looking substance with an empyreumatic odor and consistence of a solid extract when dried at about 120° C. It is soluble in hot alcohol, the alcoholic solution being acid to litmus. Dilute solutions in alcohol are of a golden brown color. It gives a green colored solution and precipitate with iron chloride solution and precipitates gelatin solution. It acts as an alkaloidal precipitant; some alkaloids such as strychnine sulphate, quinine bisulphate, sparteine sulphate being precipitated at once while other alkaloids are precipitated slowly. Further chemical study of this substance will be undertaken later.

Five hundred grams calisaya bark yielded 35 gm. of this substance.

V. Conclusions

The preparation of tincture of cinchona has been investigated with the view of making a therapeutically active and stable preparation.

Close to a hundred samples of the simple tincture have been prepared with a view of finding the best menstruum and method.

As a result of these studies the following method and menstruum are proposed:

Moisten the bark with acetone and macerate for 24-48 hours. Transfer the bark to a percolator and percolate with acetone until 5 cc. of the percolate mixed with 10 cc. distilled water and one drop of gelatin test solution gives a faintly greenish slightly opalescent liquid. Remove the bark from the percolator and dry it on a water bath at a temperature not exceeding 60° C.

Now prepare a tincture by the U. S. P. method using a menstruum of four volumes of alcohol and one of water (78 p. c. alcohol). Into the receiving vessel place 7.5 p. c. glycerin of the volume of tincture being prepared and complete percolation to the desired volume.

Such a procedure, it is believed, yields a tincture with the cause of precipitation—the hydrolyzing tannins—removed or almost completely so.

This is a preliminary report and it is hoped that other investigators will verify this method and report their findings.

Acknowledgment

The author wishes to acknowledge with thanks the assistance of Dr. E. Fullerton Cook, Chairman of the U. S. P. Revision Committee, who kindly supplied the bark and part of the apparatus used in this investigation, as well as many valuable suggestions during the course of the experiments.

BIBLIOGRAPHY

1. Cripps, R.: Tincture Deposits; *A. J. Ph.*, 1884, p. 101.
2. Squibb, E. R.: Extraction of Cinchona by Acetic Acid; *A. J. Ph.*, 1899, p. 305.
3. Scoville, W. L.: *J. A. Ph. A.*, 1920, p. 864; *ibid.*, p. 844, 1921; *ibid.*, p. 104, 1922.
4. Scoville, W. L.: *J. A. Ph. A.*, 1927, p. 1136.
5. U. S. P. X and former revisions.
6. U. S. Dispensatory, 21st edition.
7. Scoville, W. L.: Hot Extraction of Drugs; *J. A. Ph. A.*, Mar., 1923.
8. Dittmar, M.: The Phlobaphenes; *J. A. Ph. A.*, 1923, p. 676.
9. Kraemer, H.: Applied and Economic Botany.
10. Rosenthaler, L.: *A. J. Ph.*, 1928, p. 758.
11. *Ibid.*, 1929, p. 647.

THE OCCULT POWER OF THE NIGHTSHADES

By Fred B. Kilmer, Ph. M.
New Brunswick, N. J.

IN MEDICAL annals we meet with the story of the "occult power" and the "occult virtues" of amulets, incantations, prayers, words, doings, stones, drugs and herbs.

To understand this mystic power we must trace our way back through the centuries. The Costa ben Luca, a Ninth Century Arabian, tells us that "there exist in nature many strange phenomena and inexplainable forces." These strange properties act in some "subtle and mighty fashion which is not perceptible to our senses and which we cannot account for by reasoning."

Arnold of Villanova, a Thirteenth Century theologian and scientist, who in these days would be classed as a "modernist," found in occult virtue "a property not immediately perceptible to the sense as are heat, light, cold, color, odor, and taste, and also one whose existence cannot be learned by reason or experiment but only by chance discovery."

The casual observer places the believer in things occult with the charlatan and fakir worthly only of ridicule and condemnation.

Occultism, in its inception, stood for a science born of "experiences" (experimental science) and from the beginning has been a science which investigates the hidden things of nature. As cited by Albert Magnus "when philosophers realized that everything was wonderful, they began to experiment and to bring forth what there is in things."

Primitive man found in the herbs of the field a mysterious hidden power which he assigned either to the Gods of the air, the earth, the heavens or hell. Lacking, at times, a belief in either the Gods or the devils, we do not accept this classification.

The occult power residing in the deadly nightshades is pictured vividly in the records of ancient Babylon, in Dioscorides, in Galen, and on through the "fathers" quite down to our own time.

It is not easy to make anything out of the tangled mass.

Perceptible and explainable was the narcotic soporific power residing in certain solanums.

The noxious and malignant powers were in part intelligible, and in another part recondite and occult.

Through some occult cause these plants varied in their power to react upon the body. Belladonna and Stramoniums were always poisonous, the Henbanes rarely, and the Mandrake was not classed among the poisons.

Through some occult principle, a small amount might produce a poisonous effect; at other times a large amount showed no action.

Our present knowledge leaves us still in the occult stage when we bury these varying actions under such terms as "immunity" and "idiosyncrasy."

The great Galen taught that innocent qualities of such drugs as the narcotic solanums could through some occult power cause poisonous symptoms. Zacchias, on the other hand, believed that these poisons carried no occult power. Mathiolas wrote that the poisonous powers in the Solanums "could act at the same time in a manifest and in an occult manner."

Through some occult power certain parts of the noxious solanums were more active than other parts. With Belladonna, the power of the berries was greater than that of the leaf or root. In Stramonium, the seeds were the more active. With the Mandrake, all power resided in the root.

Such beliefs run through the centuries; only of late has the activity of the root of Belladonna been recognized. In other plants of the group only the leaf is used, irrespective of the results of alkaloidal assay.

Possibly it is through tradition of the occult that makers of official standards adopt only certain parts of drug plants, and reject other parts, without regard to their content of active principles.

Up to the twentieth century it was held that the true mydriatic atropine could only be obtained from Belladonna. During the stress of the World War, mydriatic atropine was supplied from the Jimson Weed, a plant recorded as containing no atropine.

It was the occult power residing in the narcotic nightshades that imparted to them the halo and their mystic properties. Through their occult power they glowed at night. They were talismen, bringers of good fortunes and of disaster.

They could make or destroy kingdoms. They held the power of love and of hate.

The occult power in the narcotic solanums had a part, an important part, in the history of mankind.

The mystic power of these plants was far greater than that of the horseshoe, the rabbit's foot, or the four-leaved clover of our present era.

Behind the veil in the Jimson Weed, the Hyoscyamus, the Belladonna, and the Mandrake, man found a power that would stupefy, blind, kill, cure. After decades of centuries we pick out a mysterious something which we name an "alkaloid" that will do the same thing, and exclaim "Eureka!" Then we begin to ponder as to why these untellable substances are found in these plants, and why the elements which we call carbon, hydrogen, oxygen and nitrogen form in the nightshades these particular alkaloids.

In our every-day drugs there are still things beyond our vision. In many of them we find no "active principles," no alkaloid; the test tube reveals nothing measurable; and yet they carry great power. We have the enzyme bodies, the glandular substances, the toxins and the antitoxins; in them we can only see particles of proteid matter; within them lies an undisciplined potency. With the enzymes and with many other like substances we can only follow the philosophers of by-gone days who defined them as "ether endowed with life."

The worlds of science and of medicine are now deeply involved in the study of certain peculiar substances or properties in plant and animal life called vitamins.

After most extended research by the ablest of workers, we are still wondering as to what are the vitamins. What is their office in living things? As yet, they are intangible. We cannot produce a milligram or a kilogram of a substance and label it vitamin. We can only measure them through their potency, their as yet mysterious "occult power."

In many things we are still at one with the nomad and the caveman.

After milleniums of striving, we still marvel at the hidden "occult power" in the nightshades and in other plants.

"Beyond all that the eye may see, that the ear may hear, that the hands may feel, outside of taste, smell, outside of any native sense, there lies an unseen, unheard, unfelt universe, whose fringe we are just beginning to explore."

THE TECHNIC OF EXTRACTING LIQUIDS WHICH FORM EMULSIONS

By Walter Weinberger

IN ORDER TO identify an unknown substance or to determine in what quantity it is present, we must, in general, have it fairly well isolated. In dealing with complex mixtures of organic and inorganic material, the most convenient, and often the only, scheme of separating the mixture into its constituent parts is that of extraction.

Sometimes, on extracting material with immiscible solvents (*e. g.*, extracting organic matter out of an aqueous layer with ether) the liquid emulsifies when shaken and does not separate again into two layers.

How to deal with such emulsions frequently proves to be a puzzling question. The problem is often an insurmountable obstacle to the beginner. It is a time-consuming difficulty even to the competent worker, and one who has had little experience in dealing with emulsions is often at a loss to know what to do.

By way of a paradox the easiest way of dealing with an emulsion is to avoid it. Determine by trial, by mixing a little of the liquid and some solvent in a test tube, whether or not the liquids cleanly separate into two layers. If they do not, and if the emulsion formed is not easily broken by one of the methods outlined below, do not transfer to a separatory funnel. Evaporate the material to dryness, if practical, warm the residue with the appropriate solvent and filter, or extract the residue in a continuous extractor. It is sometimes possible to make an alcohol extract of the material, evaporating off most of the alcohol and extracting the alcohol soluble matter, in this way obtaining the desired separation. Deal directly with the emulsion only if nothing else offers a way out.

The application of the following principles will, as a rule, enable one to deal with the most stubborn emulsions. They are based on the general considerations applicable to the breaking of any emulsion. The general principle is suggested, then one or two typical applications are given.

1. The addition of an excess of the dispersed phase.

If the liquid emulsifies when shaken so that it does not separate again into two layers it may often be made to do so by the addition of more solvent or of more water, as determined by trial in a test tube.

2. The addition of a solvent common to both phases.

The addition of small quantities of alcohol often serves to bring about a rapid and clear separation.

The addition of phenol in similar manner, when alcohol does not help, is often effective.

3. Destruction of the emulsifying agent.

If soap is the emulsifying agent the addition of acid is sufficient to cause de-emulsification.

If albumen or albuminous matter is causing the trouble it may be coagulated by a few drops of formaldehyde. Some of the most persistent emulsions are easily broken by this means.

4. Salting out.

The addition of anhydrous sodium sulphate or ammonium sulfate or of calcium chloride will often facilitate the separation of the layers. The usefulness of such salts should be determined by a preliminary trial in a test tube.

5. Filtration.

If what is apparently an emulsion is due to the presence of some flocculent precipitate the trouble may be remedied by filtration.

6. Heating, freezing, and electrolyzing.

It is a simple matter to immerse the separatory funnel in the steam bath. Exposing the emulsion to heat for a few minutes will often find the ether laying floating clear above.

7. Centrifuging.

Centrifugal force accomplishes a rapid separation of the two liquids according to their densities. This universally successful method is too well known to require further explanation.

Often the emulsion is not one that fills the whole separatory funnel, but is merely present as a broad layer at the interface of the two liquids, preventing a clear separation. In such a case it is best to run this viscous layer into a separate separatory funnel, and to treat it by itself, while the clear portions of the liquids are easily extracted in the usual manner.

I may note here the too-obvious precaution, that in dealing with emulsions it is well not to shake the separatory funnel too vigorously.

One could continue indefinitely with mechanical details, but with proper foresight, an application of the principles, and a knowledge of the nature of the emulsion, the problem of the "emulsion in the separatory funnel" must lose some of its perplexities.

MEDICAL AND PHARMACEUTICAL NOTES

OXALIC ACID CONTENT OF SOME VEGETABLES USED AS "GREENS"—The oxalic acid content of four samples of spinach ranged from 0.480 to 0.692 per cent. One sample of New Zealand spinach contained 1.198 per cent. Two specimens of beet greens contained 0.753 and 0.622 per cent. respectively. Mustard kale, turnip tops, and dandelion leaves contain no oxalic acid. A wide variation in the amount of oxalic acid occurs in the oxalic acid content of different samples of the same vegetable.—Alice E. Ryder (*J. Home Econ.*, 1930, 22, 219; through *Chem. Abstr.*, 1930, 24, 2511).

BENZOYL PEROXIDE TREATMENT OF IVY POISONING—A new method for treating poisoning from poison ivy or poison oak has just been reported to the American Medical Association by Dr. Paul D. Lamson of Nashville, Tenn.

These plants produce their unpleasant effect by means of a poison called toxicodendrol. Toxicodendrol can be neutralized or made non-poisonous by changing its chemical composition so that the proportion of oxygen is increased. Benzoyl peroxide produces this change and is besides a non-irritating, non-poisonous substance.

When benzoyl peroxide powder is dusted well over the spots affected by poison ivy, and kept in place by a light bandage, the itching disappears in about fifteen or twenty minutes and does not return for eight or ten hours after a single application. It is not a certain cure in all cases, but it does relieve the itching and prevent further spread of the poison, even where it does not cure.

TONSIL REMOVAL NOT PANACEA—Removal of the tonsils does not give a child sure protection against many or in fact any of the usual health hazards of childhood, Dr. Albert D. Kaiser, of Rochester, N. Y., has reported to the American Medical Association. Dr. Kaiser's report is based on a study of over 4000 Rochester school children.

Removing a child's tonsils and adenoids has become so common a procedure that approximately half the older children of American cities have had this done, Dr. Kaiser estimated. The operation has been performed in the hope of relieving or preventing a great variety of conditions. Actually it benefits some but not all of them, according to this study.

Sore throats were impressively fewer in the children whose tonsils had been removed. Likewise fewer of these children had scarlet fever, diphtheria and inflammation of the glands of the neck.

Acute head colds and inflammation of the inner ear were appreciably reduced during the first three years following removal of the tonsils, but were not much affected during a ten-year follow-up period.

Laryngitis, bronchitis and pneumonia not only were not benefited by the removal of tonsils but actually occurred more frequently in children whose tonsils were removed.

These children were less likely to get a first attack of rheumatic fever, St. Vitus' Dance, growing pains or rheumatic heart trouble, but removing the tonsils did not seem to help recurrent attacks of these conditions. The children whose tonsils were removed at an early age were least likely to have these diseases.—*Science Service.*

Ineffective Tooth Pastes and Mouth Washes—Tooth decay cannot be averted by the regular use of antiseptic mouth washes and tooth pastes, if too much sugar is eaten. This is the conclusion of Dr. Russell W. Bunting, professor of dental histology and pathology at the University of Michigan, based on his crucial experiments carried out on a large number of school children.

Dr. Bunting and his associates selected three groups of children. To one group they prescribed an antiseptic mouth wash twice daily without putting them on a special diet, and to the two other groups they prescribed in addition to the mouth wash a well balanced diet, in which sugar was eliminated except as it was used in cooking to make foods palatable. These children had no sugar on cereals, in beverages, very little sweetened preserves and pastry, and little or no candy.

The results of these experiments, which lasted for nine months, were striking. Two-thirds of the children who used the mouth wash only, developed extensive dental caries, whereas in the children kept

on a relatively sugar-free diet, not a single vestige of active caries appeared during the year, and cavities already present did not increase in size.

Dr. Bunting's experiments constitute the first successful attempt to eliminate tooth-decay in a large group of children. They show that little or nothing can be accomplished by pastes or mouth washes without proper diet.

The importance of diet in the hygiene of teeth is further demonstrated by recent experiments of Mrs. May Mellanby of London. She has shown that puppies developed extremely poor teeth if Vitamin D, the rickets-preventing vitamin, was excluded from the diet. But since typical caries does not occur in dogs, the relation between Vitamin D and this disease can only be determined in man. Experiments dealing with vitamins as possible causes of human tooth decay are now being carried out in England.—*Science Service.*

Potassium Emanation—The common chemical element potassium gives off gamma rays similar to X-rays or the gamma rays of radium. At the State Radiological Institute at Prague Dr. F. Behounek has confirmed the researches of Dr. W. Kohlhörster which gave evidence of these rays from potassium about two years ago.

Dr. Behounek finds that potassium chloride really emits gamma rays, the intensity of the rays being proportional to the amount of potassium. He also finds that there are two groups of gamma rays, one about as penetrating as the similar rays from radium, the other about twice as penetrating. However, their intensity is very low, so that very delicate apparatus is needed to detect them. It has been supposed that potassium resembles radium in that it is constantly decaying, with the liberation of gamma and other rays, and that in 1,000,000,000,000 years half of a given amount of potassium would have disappeared into radiation. Radium will lose about half of its original mass in 1750 years. But Dr. Behounek finds that the intensity of the gamma rays from potassium is much less than would correspond to the generally accepted period of decay.

Sugar Injection in Barbital Poisoning—The injection of a large volume of sugar solution into a vein enables the patient or the experimental animal to recover from the effects of barbital pois-

oning, Drs. A. B. Luckhardt and Carl A. Johnson of the Hull Physiological Laboratory of the University of Chicago have discovered.

Barbital is widely used as a sleeping powder for human patients, as well as in laboratory animals, but its use is not without danger and frequently gives rise to serious poisoning. It was known for some time that barbital is excreted slowly and almost unchanged in the urine. If the excretion of the drug could be hastened, the chances of the recovery of the patient would improve.

Drs. Luckhardt and Johnson succeeded in hastening the excretion through the kidneys by injection of 5 to 10 per cent. grape-sugar (dextrose) solutions into the vein. The injection of about 35 grains of barbital produced a sleep lasting for forty hours in normal dogs, but if the dogs received from one to two liters of dextrose solution after the dose, the recovery time was reduced to between fourteen and eighteen hours.

A woman who had taken sixty grains of barbital apparently with suicidal intentions, was given one and one-half liter sugar solution three to four hours later. The injection produced marked increase in the secretion of urine; in six hours she passed 1100 cc. of urine. Five hours after the sugar injection she could easily be roused and another six hours later showed almost no symptoms from the drug.

There is little doubt that increasing the efficiency of the kidneys by injections of large volumes of fluids will continue to save life in accidental and intentional barbital poisonings.—*Science Service.*

Rubber From Dogbane—A victim of disparagement for many years, dogbane or India hemp, a common weed, has at last been given a place in the society of plants of economic value.

Scientific research, according to the Missouri Botanical Garden Bulletin, has revealed that the weed, known scientifically as *Apocynum,* has rich rubber content.

"One of the most significant factors concerning the study of the latex of *Apocynum,*" says the Bulletin, "is that the rubber content increases to a large extent with drought and infertility of the soil."

Medicinal Plants of Commerce Discussed in New Publication—In a new bulletin, "American Medicinal Plants of Commercial Importance," the United States Department of Agriculture

reports a comprehensive study of the wide range of wild plants used in the preparation of medicines.

Many wild plants, some of them weeds, some popular wild flowers and others important forest trees, have long been used in the practice of medicine. Since the days of the earliest settlers the collection of plants for the crude drug market has provided employment for many people in rural communities. Many people believe that this is an easy and highly remunerative occupation, but in fact it is often tiresome, is only moderately remunerative, and markets are usually limited. Persons who desire to engage in this work first learn to recognize the marketable plants that are to be found in their locality.

In this bulletin, A. F. Sievers of the Bureau of Plant Industry, describes 128 plants of medicinal value and commercial importance and indicates methods of handling. Accompanying each description is a picture of the plant.

Copies of Miscellaneous Publication 77-M, "American Medicinal Plants of Commercial Importance," may be obtained free by writing to the Office of Information, U. S. Department of Agriculture, Washington, D. C.

HUMAN SKIN HAS BACTERIA-KILLING POWER—Human skin is more than a mechanical protection against infectious diseases. It is an efficient external organ for killing pathogenic micro-organisms or disease germs.

Drs. Harry A. Singer and Lloyd L. Arnold of the Research Laboratory, State Department of Health, Chicago, applied broth cultures of disease-producing bacteria to skin surfaces. They found that within ten minutes from 90 to 95 per cent. of all the bacteria were killed. The germs of typhoid fever were among the bacteria most readily killed by human skin.

These results, however, were obtained only with clean skin. On dirty or greasy skins the same bacteria survived for many hours. The finger nail region was deficient in bacteria-killing power.

KOJIC ACID—Recent demonstration by the Bureau of Chemistry and Soils of the United States Department of Agriculture that molds of a certain species can produce gluconic acid, which is used in the

preparation of a cheap calcium salt which has important medicinal qualities, has been followed by the production in that bureau of another compound which has possibilities of industrial utilization, members of the American Chemical Society were told at their annual meeting in Cincinnati.

Orville E. May and Horace T. Herrick of the Department of Agriculture said that the latest organism to be put to work in the department's laboratories gives large yields of kojic acid when grown on corn sugar solution. Kojic acid has been produced for some years by the Japanese, together with sake and various condiments, by the action of mixed mold cultures on starchy products.

Kojic acid has a peculiar structure which is similar to that possessed by many of the natural plant coloring matters and may provide a basis for theoretical observations on the production of these colors in their natural state. This new compound also has possibilities of industrial utilization, and with a view to testing these possibilities, the department has sent samples of kojic acid to several industrial organizations.

Recent work of the Department of Agriculture on fertilizers, insecticides, vitamins in plant foods, industrial fermentations and food preservation will be presented to the chemical society in forty papers by scientists of the Bureau of Chemistry and Soils.

CARROTS AND VITAMINS—Evidence that animals can manufacture the growth promoting vitamin A in their bodies from carotin, the yellow coloring matter of some of their foods, has just been reported to the Medical Research Council by Dr. Thomas Moore of the Nutritional Laboratory at Cambridge, England. Dr. Moore's discovery reverses an earlier theory about vitamin A, that it is not made by the animal and that all of it found in animal bodies and glands comes directly from the food eaten.

Vitamin A, besides promoting normal growth, increases resistance to disease. It is found in animal fats, such as butter and beef fat, in eggs, milk and vegetables. It has always been found together with this yellow pigment, carotin. The yellow of the egg, butter, yellow carrots, and yellow corn contain this vitamin. White corn, white carrots and white turnips, however, have very little vitamin A compared to the amount found in the yellow varieties. In green vegetables which contain this vitamin, carotin is also present

but its color is hidden by the green color of chlorophyll which is abundant in such plants.

Not only do the two substances occur together but carotin has the same effect on growth and bodily vigor and health as vitamin A. Extracts of pure carotin can cure animals suffering from deficiency of vitamin A just as feeding the vitamin could cure them.

Chemical tests show that the two substances are not identical and scientists were at a loss to explain the matter until Dr. Moore's investigation showed that the carotin or some part of it is changed into vitamin A in the animal's body.

Dr. Moore fed rats on a diet lacking vitamin A until all the excess of this vitamin which they had stored in their livers and elsewhere in their bodies was used up. Then he fed them carotin in as pure an extract as he could get. The rats, which had been weak and sickly, recovered, and when a large amount of carotin had been fed, examination of their livers showed that they again had stored up some vitamin A. They had manufactured it from the carotin, Dr. Moore concluded.

NEWS ITEMS AND PERSONAL NOTES

GEORGE S. DAVIS, DECEASED.

It is with regret that we announce the death, on October 1, of George S. Davis, one of the men to whom the house of Parke, Davis & Company owes its corporate name. Mr. Davis, who was eighty-five years old and who had been in poor health for a considerable period, retired from active business efforts over thirty years ago.

A native of Detroit, he began his business career as a clerk in a retail drug store. Later he engaged in the wholesale drug business, and then, in 1867, he associated himself with the pharmaceutical manufacturing concern of Duffield, Parke & Company. In 1871 Dr. Duffield retired from the company and the firm name became Parke, Davis & Company, with Mr. Davis occupying the position of general manager.

George S. Davis was a man of unusual creative force. His energy and enthusiasm coupled with his ability for discovering, developing and organizing men made him a big factor in the expansion of the business of the concern during the first quarter century and more of its existence. His, in a great measure, were the original methods that marked a new era in supplying the pharmaceutical needs of the medical profession and the drug trade.

Mr. Davis is survived by his widow, and by a brother, James E. Davis, both of whom live in Detroit. He was a member of the Masonic order and of the Sons of the American Revolution. His grandparents, both paternal and maternal, took part in the Revolutionary War.

GRADUATE FELLOWSHIPS AWARDED AT PHILADELPHIA COLLEGE —Official announcement has just been made by the Philadelphia College of Pharmacy and Science of the award of three graduate fellowships in pharmaceutical research.

Thomas J. Lolli, 3261 Fulton Road, Cleveland, Ohio, has been named to hold the fellowship established by Eli Lilly and Company, world renowned pharmaceutical manufacturers of Indianapolis, to carry on work in the enteric coating of tablets, pills and capsules.

Pioneer work in this field was successfully prosecuted at the Philadelphia College during the school year 1929-30 by Milton Wruble, a graduate of the chemical engineering course of the University of Michigan who received in June the degree of master of science from the Philadelphia College.

Wruble's results were reported in the AMERICAN JOURNAL OF PHARMACY published at the Philadelphia College and the oldest journal of its kind in the United States.

The successful development of a practical process for enteric coating on a commercial scale is held by physicians and pharmacists to be of great therapeutic and pharmaceutical importance. The object of enteric coating is to provide a means by which medicines, intended for treatment of the ailments of the intestinal tract, kidneys and bladder, may pass to those points without solution or disintegration by the gastric juices of the stomach. Solution or disintegration by the gastric juices not only may destroy the effectiveness of the remedial agent but also may result in serious stomach and other disorders.

Lolli received the degrees of bachelor of science in pharmacy from Ohio State University in 1930.

A special fellowship for graduate research in pharmacy under the terms of a foundation at the Philadelphia College has been awarded this year to Alfred L. Barthen, 15 Hill Street, Carnegie, Pennsylvania.

Barthen holds the degrees of pharmaceutical graduate and bachelor of science in pharmacy from Duquesne University of Pittsburgh and recently has been engaged in retail pharmacy at Carnegie.

Ruth E. Miller, who received the degree of master of science in bacteriology from the Philadelphia College in 1930 is continuing, under a grant from the Mellon Institute of Pittsburgh, a study at the Philadelphia College of bacteriological phases of certain new pharmaceutical preparations of iodine. This research is being carried on under the auspices of the Chilean Government. Linwood F. Tice, who has held the fellowship during the past year, developed the pharmaceutical preparations which are being studied by Miss Miller. Tice has since accepted an appointment as professor of theoretical and practical pharmacy at Baylor University, Dallas, Texas.

BOOK REVIEWS

HANDBOOK OF PHARMACOGNOSY. 2nd enlarged edition, by Dr. A. Tschirch, Professor of Pharmacognosy and Pharmaceutical Chemistry, with the collaboration of 14 German, Swiss and Austrian Specialists; with several hundred illustrations, charts, etc., in about 30 issues of $2.00 each, not singly available. Bernhard Tauchnitz, Leipzig, 1930.

While the third volume of the first edition is still being issued, the new edition has been made necessary by the welcome given to the first two volumes of this monumental work. Here drugs and drug plants are discussed in the fascinating manner of human experience from a botanical, chemical, medicinal, geographical, agricultural, ethnographical and agricultural viewpoint and artistically as well as scientifically illustrated with unusual plates, drawings, photographs, charts and copies of rare paintings, all pertaining to the broad interests of drug knowledge.

In the first two issues we find a detailed discussion of the meaning and objects of Pharmacognosy. With the views here expressed we are very much in sympathy.

A new chapter on drug cultivation in the moderate zones has been contributed by Dr. W. Himmelbaur of Vienna, who deserves so much credit for his own success in this field. He also prepared a very useful calendar for the collection of some Middle European drug plants, which is loosely appended for exhibition in pharmacies.

Tschirch discusses the cultivation of medicinal and spice plants, mainly in tropical countries, and the collection of drugs.

The unique division of crude drugs in chemically related groups and their discussion under such chemically classified groupings is retained. Thus the issuance of one part dealing with the carbohydrate drugs is announced as the next forthcoming issue.

No one, we feel, who is at all interested in drugs and spices, should fail to subscribe to this informative, entertaining and stimulating handbook.

ARNO VIEHOEVER.

HANDBOOK OF PHARMACY. By Dr. L. Rosenthaler, professor at the University of Bern, Switzerland, 114 pages and 8 text figures, A Nemayer, Mittenwald, Bavaria.

From the foreword we learn that the author has collected this information primarily for a set of lectures given to better equip the pharmacy student as well as the practicing pharmacist in the scientific task of compounding prescriptions and the making of preparations. He discusses difficulties which may be encountered in prescription work and ways to overcome these, hydrogen ion concentration and the determinations involved, the effect of glass (as alkalinity) and metals in other containers on medicinal substances and preparations, the influence of light, and the purity of water to be used.

Considerable space is given to the discussion of solutions, general and specific, to filtration problems and pharmaceutical preparations as mixtures, decoctions, emulsions, gels, powders, pills, ointments. He urges the adoption of a drop counter on the basis of interesting data and concludes with chapters on homœopathic prescriptions and the filling and sterilization of ampules.

The backbone of any profession is science and this contribution to scientific pharmacy is to be hailed by all who are concerned with its application and growth.

ARNO VIEHOEVER.